Recently two bottles of unwanted chemicals were collected at the Chemical Management’s Building (CMB) on campus. At times, the CMB, will bulk certain classes of chemicals together, and this was going to be done with these two chemicals. A student employee was getting ready to open a bottle, and another student employee noticed crystals at the bottom of the bottle. They slowly put the bottle down and handled it more appropriately.

We are not alone in dealing with possible peroxide crystals. Another university recently had a student that was distilling methyl progargyl (about 40mL) with a short path condenser. The condenser was connected to a 100mL round bottom flask. The first 20 mL came off just fine at the bp (about 60°C). He then collected the first fraction and then noticed that the temperature began to rise about 70°C and decided to lower the heating mantle and stop the distillation with about 15 mL remaining in the pot. He opened the hood about 12 inches and started to lower the heating mantle and the solution detonated. Fortunately, it was a small enough amount that he had not burns. The shattering glass caused two ¾ inch cuts on his right fingers, which required stitches, but they were very lucky, things could have been much worse.

We all know there are many bottles in our building that have had more birthdays than many of our students, and even more than us. Sometimes this is okay, and at other times this can be very hazardous.

Peroxides are a class of compounds that have the ability to form shock-sensitive explosive peroxide crystals. Many of the organic solvents commonly used in laboratories have the potential to form explosive peroxide crystals. Diethyl ether...
Peroxide Explosion Injury

and tetrahydrofuran are two of the more common peroxide-forming chemicals used today. Therefore, it is extremely important that this procedure be followed regarding the identification, handling, storage, and disposal of peroxide-forming chemicals.

Because of these examples above and others, we would like to target removing any potential hazardous bottles out there. Risk Management will be looking at our inventories, and notifying us if they see a concern in our labs. These are very costly to remove, and so they are hoping to capture all of them at once.

If we have peroxide forming chemicals you should:
1. Inspect them quarterly. Chem Stores sells test strips.
2. Write the date of the test on the outside of the container.
3. Look for the two signs that the material is contaminated: (1) Hard crystal formations in the form of ice-like structures, crystals, solid masses, or an obscure cloudy medium signify gross contamination and (2) Wisp-like structures floating in a clear liquid suspension signify contamination.
4. If you see these in any known peroxide-forming chemical, call Risk Management immediately. Do not handle or open the chemical under any circumstance.

Peroxide-Forming Solvents Table

(Taken from Berkeley EH&S, ehs.berkeley.edu/lesson-learned-peroxide-explosion-injures-campus-researcher)

Category I Materials
Recommended Shelf-Life: 3 months, whether inhibited or uninhibited

- Isopropyl Ether
- Potassium Amide
- Diethyl Ketene
- Sodium Amide
- Divinyl Ether
- Sodium Ethoxyacetylide
- Potassium Metal
- Vinlylidene Chloride

Category II and III Materials
Recommended Shelf-life: 3 months, if uninhibited
12 months, if inhibited

- p-Dioxane
- Ethyl Ether
- Tetrahydrofuran
- Acetal
- Acetaledhyde
- Cumene
- Cyclohexene
- Cyclopentene
- Diacetylpentene
- Diacetylene
- Ethylene Glycol
- Dimethyl Ether
- Ethanol
- Methyl Acetylene
- Methyl Cyclopentane
- Tetrahydronapthalene
- Vinyl Ethers
- Diethylene Glycol
- Dimethyl Ether
- Other Ethers
- Chlorobutadiene
- Vinyl Acetate
- Vinyl Acetylene
- Vinyl Chloride
- Vinyl Pyridine
- Styrene